



CA-NV AWWA Water Loss Technical Assistance Program

Wave 4 Water Audit Level 1 Validation Document

Water System Name:

Quartz Hill Water District

Water System ID Number:

1910130

Water Audit & Water Loss Improvement Steps:

Water Audit Period: Select

Fiscal Year 2016-2017

Steps taken in preceding year to increase data validity, reduce real loss and apparent loss as informed by the annual validated water audit:
The District will continue to improve meter sampling program for commercial accounts.

Certification Statement by Utility Executive:

This water loss audit report meets the requirements of California Code of Regulations Title 23, Division 2, Chapter 7 and the California Water Code Section 10608.34 and has been prepared in accordance with the method adopted by the American Water Works Association, as contained in their manual, *Water Audits and Loss Control Programs, Manual M36, Fourth Edition* and in the Free Water Audit Software version 5.

Utility Provided

Executive Name (Print)

Chad J. Reed

Executive Position

General Manager

Signature

Date

10/03/2017

CA-NV AWWA Water Loss Technical Assistance Program

Wave 4 Water Audit Level 1 Validation Document

Audit Information:

Utility: Quartz Hill Water District PWS ID: 1910130
System Type: Potable Audit Period: Fiscal Year 2016/17
Utility Representation: Chad Reed (GM), Brent Byrne (Assistant GM), Debi Pizzo (Board Secretary)
Validation Date: 8/29/2017 Call Time: 1:00pm Sufficient Supporting Documents Provided: Yes

Validation Findings & Confirmation Statement:

Key Audit Metrics:

Data Validity Score: 68 Data Validity Band (Level): Band III (51-70)
ILI: 1.19 Real Loss: 22.22 (gal/conn/day) Apparent Loss: 3.27 (gal/conn/day)
Non-Revenue Water as a Percentage of Operating Costs: 2.3%

Certification Statement by Validator:

This water loss audit report has been Level 1 validated per the requirements of California Code of Regulations Title 23, Division 2, Chapter 7 and the California Water Code Section 10608.34.

All recommendations on volume derivation and Data Validity Grades were incorporated into the water audit. ☒

Validator Information:

Water Audit Validator: Will Jernigan Validator Qualifications: Contractor for CA-NV AWWA Water Loss TAP

Validator Provided

CA-NV AWWA Water Loss Technical Assistance Program Wave 4 Water Audit Level 1 Validation Document

Audit Information:

Utility: Quartz Hill Water District PWS ID: 1910130
System Type: Potable Audit Period: Fiscal Year 2016/17
Utility Representation: Chad Reed (GM), Brent Byrne (Assistant GM), Debi Pizzo (Board Secretary)
Validation Date: 8/29/2017 Call Time: 1:00pm Sufficient Supporting Documents Provided: Yes

Validation Findings & Confirmation Statement:

Key Audit Metrics:

Data Validity Score: 68	Data Validity Band (Level): Band III (51-70)
ILI: 1.19	Real Loss: 22.22 (gal/conn/day) Apparent Loss: 3.27 (gal/conn/day)
Non-Revenue Water as a Percentage of Operating Costs: 2.3%	

Certification Statement by Validator:

This water loss audit report has been Level 1 validated per the requirements of California Code of Regulations Title 23, Division 2, Chapter 7 and the California Water Code Section 10608.34.

All recommendations on volume derivation and Data Validity Grades were incorporated into the water audit. ☒

Validator Information:

Water Audit Validator: Will Jernigan Validator Qualifications: Contractor for CA-NV AWWA Water Loss TAP

Validator Provided





#	AWWA Water Audit Input	Code	Final DVG	Basis on Input Derivation	Basis on Data Validity Grade
1	Volume from Own Sources	VOS	5	Supply meter profile: 10 wells, individually metered – magmeter, SCADA tied. Pump rates are level and predictable. VOS input derived from: SCADA reads from production meters as archived. Comments: Input derivation from supporting documents confirmed. Exclusion of non-potable volumes confirmed.	Percent of own supply metered: 100% Signal calibration frequency: Annual, following Edison tests, 2-point calibration – zero and typical flow. Volumetric testing frequency: Annual via Edison efficiency tests. On 8 of the wells, they are in proximity to a tank and volumetric testing is conducted as a double checked. Volumetric testing method: Insertion type. Percent of own supply tested and/or calibrated: 100% Comments: Limiting criteria for DVG is availability of calibration documentation.
2	VOS Master Meter & Supply Error Adjustment	VOS MMSEA	3	Input derivation: Left blank in absence of available test data. Net storage change included in MMSEA input: No. Comments: No additional comments.	Supply meter read frequency: Continuous. Supply meter read method: Automatic logging via SCADA telemetry. Frequency of data review for trends & anomalies: Monthly – first business day of each month. Storage levels monitored in real-time: 8 tanks (14 MG) – connected to SCADA. Comments: Net storage change as limiting criteria for DVG. Recommend incorporating into next audit as total stored at end of audit period minus total stored at beginning of audit period.
3	Water Imported	WI	5	Import meter profile: 2 connections from AVEK (4 magmeters – tied to SCADA for supplier and receiver) N&S0th, M8&70th. Emergency interties with LA County, White Fence Farms, Palm Ranch Irrigation District – not active in audit year. WI input derived from: Totalization of volumes per invoices received from exporter. Comments: Input derivation from supporting documents confirmed. Exclusion of non-potable volumes confirmed.	Percent of import supply metered: 100% Signal calibration frequency: At least annual – 3rd party SCADA maintenance. Approximately 3-point calibration. Unsure of robustness of span verification. Going forward need to confirm with AVEK on their calibration procedures. Volumetric testing frequency: None. Volumetric testing on 1 of the turnouts is a potential. Volumetric testing method: n/a. Percent of import supply volumetrically tested: n/a. Comments: Limiting criteria for DVG is availability of calibration documentation.





#	AWWA Water Audit Input	Code	Final DVG	Basis on Input Derivation	Basis on Data Validity Grade
4	WI Master Meter & Supply Error Adjustment	WI MMSEA	5	Input derivation: Left blank in absence of available test data. Comments: No additional comments.	Import meter read frequency: Continuous feed but read monthly. Import meter read method: Automatic logging via SCADA telemetry. AVEK reads second Tues of each month. Frequency of data review for trends & anomalies: Monthly – invoice checked against SCADA. If >1-2%, prompts an intervention. Comments: No additional comments.
5	Water Exported	WE	n/a		
6	WE Master Meter & Supply Error Adjustment	WE MMSEA	n/a		
7	Billed metered	BMAC	7	Customer meter profile: Age profile: All within 11 years. Majority around 5-6 years. Out of 5800, only ~100 meters >1". Largest meter size at 4". Bedroom community. Reading system: AMR, converting to AMI. 40% converted. Goal is within next 2 years. Read frequency: Monthly. Comments: Lag-time correction is not employed in input derivation. Input derivation from supporting documents confirmed. Exclusion of non-potable volumes confirmed. It was determined that BMAC likely includes 2 QHWD connections that exist in the LA County service area that are not part of the water balance and should be removed. They are only for domestic usage, so the scale of volume is small. It is recommended to make this correction for future audits.	Percent of customers metered: 100% Small meter testing policy: Random sampling of small meter population occurs each year. Confidence limits have not been analyzed. Number of small meters tested/year: 30 Large meter testing policy: None. Number of large meters tested/year: n/a. Meter replacement policy: Ongoing via meter conversion project at ~10% each year. Number of replacements/year: 1,200 in audit year, but this was above average. Billing data auditing: Standard billing QC, plus review of volumes by use type each billing cycle. Also, run a monthly check regarding % difference last year to this year (month) to flag if something is out of trend. Comments: DVG of based on minor portion of meter stock not currently represented in the testing program.
8	Billed unmetered	BUAC	n/a		
9	Unbilled metered	UMAC	n/a		



#	AWWA Water Audit Input	Code	Final DVG	Basis on Input Derivation	Basis on Data Validity Grade
10	Unbilled unmetered	UUAC	5	Profile: Operational flushing and fire department usage. Comments: Flushing activities greatly scaled back due to drought. Custom California default of 0.25%WWS utilized.	Comments: Default grade applied.
11	Unauthorized consumption	UC	5	Comments: Default input applied.	Comments: Default grade applied.
12	Customer metering inaccuracies	CMI	7	See BMAC comments regarding meter testing & replacement activities. Input derivation: Calculated as weighted average from analysis of test data - which came to very nearly 0% inaccuracy. 0.0% utilized as input. Comments: No additional comments.	Characterization of meter testing: Routine (proactive), but not fully representative. Characterization of meter replacement: Ongoing (proactive), annual. Comments: DVG of based on minor portion of meter stock not currently represented in the testing program.
13	Systematic data handling errors	SDHE	5	Comments: Default input applied.	Comments: Default grade applied.
14	Length of mains	Lm	8	Input derivation: Totaled from GIS based map. Hydrant leads included. Estimated this in from 550 hydrants, with average lead length of 10'. Comments: No additional comments.	Mapping format: Digital. Asset management database: In place and integrated with GIS system (Elements – SQL database). Map updates & field validation: Accomplished through normal work order processes. Comments: No additional comments.
15	Number of service connections	Ns	10	Input derivation: Detailed query from billing system to analyze unique record count. Basis for database query: Location or other premise-based ID. Comments: Select	CIS updates & field validation: Accomplished via specific efforts for service inventory, outside of normal meter reading processes. Estimated error of total count within: 1%. Comments: No additional comments.
16	Ave length of cust. service line	Lp	10	Comments: Default input and grade applied, as customer meters are typically located at the property boundary given California climate.	
17	Average operating pressure	AOP	7	Number of zones, general profile: 6 zones, all gravity fed. Typical pressure range: 45 -100 Input derivation: Calculated as simple average from analysis of field data. Comments: No additional comments.	Extent of static pressure data collection: Hydrant pressures taken during routine system flushing and/or hydrant testing. HGL analysis conducted to tabulate predicted static pressures at various points in the system.



#	AWWA Water Audit Input	Code	Final DVG	Basis on Input Derivation	Basis on Data Validity Grade
18	Total annual operating cost	TAOC	10	Input derivation: From official financial reports. Comments: Confirmed costs limited to water only, and water debt service included.	Characterization of real-time pressure data collection: Pressure loggers at 3 areas within the system – serving as proxy for well-covered real-time monitored. Hydraulic model: None currently in place. Comments: No additional comments.
19	Customer retail unit cost	CRUC	10	Input derivation: Total consumptive revenue divided by Billed Metered Authorized Consumption. Sewer charges are not applicable. Comments: No additional comments.	Frequency of internal auditing: Annually. Frequency of third-party CPA auditing: Annually. Comments: No additional comments.
20	Variable production cost	VPC	7	Supply profile: Mixed source portfolio; Variable Production Cost valued at most expensive source. System is in an adjudicated basin. If exceed allotment, then they incur a replenishment cost. No matter what happens, 1600 AF will be pumped from the wells to maintain the allocation. Primary costs included: Purchase costs as most expensive source. Secondary costs included: Solids handling, pumping equipment wear & tear, and impending expansion of supply deemed categorically inapplicable. Liability not evaluated. Comments: No additional comments.	Characterization of calculation: Weighted average composite of all rates. Input calculations have been reviewed by an M36 water loss expert. Comments: No additional comments.



Key Audit Metrics

(~)	VALIDITY	Data Validity Score: 68	Data Validity Band (Level): Band III (51-70)
(#)	VOLUME	ILI: 1.19	Real Loss: 22.22 (gal/conn/day)
(\$)	VALUE	Annual Cost of Apparent Losses: \$8,993	Apparent Loss: 3.27 (gal/conn/day)
			Annual Cost of Real Losses: \$75,312

Infrastructure & Water Loss Management Practices:

Infrastructure age profile: Some back into the 1960s, bulk from the 1990s. Infrastructure replacement policy (current, historic): None based on very young age of network.

Estimated main failures/year: 2 – but both tied to tree roots. Estimated service failures/year: ~50.

Extent of proactive leakage management: Passive LD only.

Other water loss management comments: No additional comments.

Comments on Audit Metrics & Validity Improvements

The Infrastructure Leakage Index (ILI) of 1.19 describes a system that experiences leakage at 1.19 times the modeled technical minimum for its system characteristics. The Data Validity Score falling within Band III (51-70) suggests that next steps may be focused simultaneously on improving data reliability and evaluating cost-effective interventions for water & revenue loss recovery. Opportunities to improve the reliability of audit inputs and outputs include:

- Improved understanding of Supply Meter (Own or Import) Master Meter Error: consider adopting or increasing the rigor of a source meter volumetric testing and calibration program, informed by the guidance provided in AWWA Manual M36 – Appendix A.
- Temporal alignment of Billed Metered Authorized Consumption with Water Supplied: consider pro-rating the first and last months of the audit period to better align consumption with actual dates of use, and using read date as basis for reporting.
- Improved estimation of CMI by incorporating large meters into testing program.
- Customized estimate of Unbilled Unmetered Authorized Consumption: consider producing itemized, agency-specific estimates of unbilled unmetered (operational) uses, rather than using the default. Ensure leakage estimates are excluded.

When the CA-NV AWWA Water Audit Validator (WAV) program comes online after this year, is the utility planning on having a staff member become certified to perform the Level 1 Validation for future audits? Yes.